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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/977,065	10/12/2001	Jyoti Kiron Bhardwaj	25-4 US	1790
27975	7590	01/25/2005	EXAMINER	
ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST P.A. 1401 CITRUS CENTER 255 SOUTH ORANGE AVENUE P.O. BOX 3791 ORLANDO, FL 32802-3791			SUCHECKI, KRISTYNA	
			ART UNIT	PAPER NUMBER
			2882	

DATE MAILED: 01/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/977,065

Applicant(s)

BHARDWAJ ET AL.

Examiner

Krystyna Suchecki

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Response filed 10/29/04.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,6-39 and 41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8,25,38 and 41 is/are allowed.
- 6) ☒ Claim(s) 14-17 and 27-30 is/are rejected.
- 7) ☒ Claim(s) 1,2,6,7,9-13,18-24,26,31-37 and 39 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Inventorship

1. The declaration filed 02/11/02 is insufficient to add Hiroaki Yamada as a named inventor. Hiroaki Yamada is not listed on the originally filed declaration or the originally filed application data sheet. A proper request under 37 CFR 1.48 must be made.

Claim Objections

2. Claims 1, 12, 14, 21 and 34 are objected to because of the following informalities: Claim 1, at the 21st line, "have" should be "having". Claim 12, line 7 should have "an overcladding" and lines 10-11 should have their commas and semicolons corrected. Claim 14, line 20 should have "said step of forming the protective". Claim 21, line 11 delete a 'd' from "overcladding". Claim 34, on page 14 of the amendment at line 2, should read "comprised of silicon nitride and has" Appropriate correction is required.

3. Claims 15-17 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The claims recite features already present in claim 14.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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5. Claims 14-17 and 27-30 are rejected under 35 U.S.C. 102(b) as being anticipated by article to Kilian (cited by Applicant).

6. Regarding Claims 14-17, Killian teaches a method for forming a planar lightwave circuit comprising forming at least one optical waveguide core; providing a substrate and an undercladding formed over the substrate, over which the core is formed (p. 193); forming at least one feature proximate the core having at least one stress-engineered property to balance stress and therefore minimize birefringence affect the core, wherein the step of forming the at least one feature comprises the steps of forming an overcladding layer over the core (pp. 193, 197); and doping the overcladding to balance stress affecting the core, wherein the overcladding is doped to have a coefficient of thermal expansion approximately matched to that of the substrate to thereby symmectrically distribute stress in the undercladding between the overcladding and the substrate, and therefor away from the core (p. 193); and forming a protective passivation layer over the core and the feature, the passivation layer formed to be substantially non-interfering with the balanced stress affecting the core provided by the feature, said forming the protective passivation layer comprising the step of forming the layer to have a coefficient of thermal expansion approximately matched to that of the overcladding such that it is substantially non-interfering with the balanced stress affecting the core provided by the overcladding (p p. 193, 197). Killian teaches the “balance” feature, since Killian considers the tradeoffs of the birefringence properties of the formed waveguide (i.e., ‘balances’ them). Also, the term “balance” does not necessarily mean “balanced to zero” or “balanced equally” so a non-zero state is not precluded. Not withstanding the “balance” feature, Killian also teaches a birefringence free waveguide (p. 196). Killian teaches the approximate matching by implying

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that routine experimentation will yield thermal expansion coefficients for the substrate and overcladding which will symmetrically distribute stress (p. 196) and goes on to state the “slightly lower” (i.e., “approximately matched”) thermal expansion of the cladding with respect to the substrate yields a well balanced stress distribution state (p.197). The passivation layer is SiO₂-rich, and the overcladding thermal expansion coefficient is approximately matched to the SiO₂ substrate. The passivation layer should then be “approximately” matched, and p. 193 discusses the layer property of being substantially non-interfering with the balanced stress.

7. Regarding Claim 27, Killian teaches a method for protecting, and balancing stress in, a planar lightwave circuit having at least one optical waveguide core, comprising using at least one feature proximate the core embodying at least one stress-engineered property to balance stress and therefore minimize birefringence affecting the core; and using a protective passivation layer over the core and the feature, the passivation layer formed to be substantially non-interfering with the balanced stress affecting the core provided by the feature (pp. 193, 197). Killian teaches the “balance” feature, since Killian considers the tradeoffs of the birefringence properties of the formed waveguide (i.e., ‘balances’ them). Also, the term “balance” does not necessarily mean “balanced to zero” or “balanced equally” so a non-zero state is not precluded. Notwithstanding the “balance” feature, Killian also teaches a birefringence free waveguide (p. 196).

8. Regarding Claim 28, Kilian teaches the method further wherein said using the feature includes using an overcladding layer over the core, doped to balance stress affecting the core (pp. 193, 196, 197).

9. Regarding Claim 29, Kilian teaches the method further wherein the circuit includes a substrate and an undercladding formed over the substrate, over which the core is formed; and

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wherein the overcladding is doped to have a coefficient of thermal expansion approximately matched to that of the substrate to thereby symmetrically distribute stress in the undercladding between the overcladding and the substrate, and therefore away from the core (pp193, 196 and Table II). Killian teaches the approximate matching by implying that routine experimentation will yield thermal expansion coefficients for the substrate and overcladding which will symmetrically distribute stress (p. 196) and goes on to state the “slightly lower” (i.e., “approximately matched”) thermal expansion of the cladding with respect to the substrate yields a well balanced stress distribution state (p.197).

10. Regarding Claim 30, Killian teaches the method further wherein the passivation layer has a coefficient of thermal expansion approximately matched to that of the overcladding such that it is substantially non-interfering with the balanced stress affecting the core provided by the overcladding (p. 193). This is shown since the passivation layer is SiO₂-rich, and the overcladding thermal expansion coefficient is approximately matched to the SiO₂ substrate. The passivation layer should then be “approximately” matched, and p. 193 discusses the layer property of being substantially non-interfering with the balanced stress.

Allowable Subject Matter

11. Claims 8, 25, 38 and 41 are allowed.

12. Claims 1, 2, 6, 7, 9-13, 21 and 34 would be allowable if rewritten to overcome the claim objections listed above.

13. Claims 18-20, 22-24, 26, 31-33, 35-37 and 39 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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14. The following is a statement of reasons for the indication of allowable subject matter:

Claims 8, 12, 21, 25, 34, 38 and 41 contain allowable subject matter for at least the reasons indicated in the Office action dated 04/07/04.

15. Claims 1, 18 and 31 contain allowable subject matter for at least the reason that the prior art of record fails to teach or reasonably suggest a planar lightwave circuit, method for making same or method for protecting and balancing stress in a planar lightwave circuit having at least one optical waveguide core comprising a stress-engineered property proximate a core comprising an overlcladding layer doped with a particular coefficient of thermal expansion and protective passivation layer over the property designed for a particular stress and further comprising silicon nitride as claimed.

16. Claims 19, 26, 32 and 39 contain allowable subject matter for at least the reason that the prior art of record fails to teach or reasonably suggest method for making a planar lightwave circuit or method for protecting and balancing stress in a planar lightwave circuit having at least one optical waveguide core comprising a stress-engineered property proximate a core comprising an overlcladding layer doped for a particular coefficient of thermal expansion and a protective passivation layer over the property designed for a particular stress and further comprising an undercladding with portions adjacent the core removed to a point lower than the core as claimed.

17. Claims 20, 24, 33 and 37 contain allowable subject matter for at least the reason that the prior art of record fails to teach or reasonably suggest method for making a planar lightwave circuit or method for protecting and balancing stress in a planar lightwave circuit having at least two optical waveguide cores comprising a stress-engineered property proximate a core comprising an overlcladding layer doped for a particular coefficient of thermal expansion, a

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protective passivation layer over the property designed for a particular stress and further comprising an undercladding between the cores and a stress release groove is formed through the overcladding between the two cores as claimed. Claims 22, 23, 35 and 36 contain allowable subject matter at least by virtue of their dependency.

Response to Arguments

18. Applicant's arguments, see Remarks, filed 08/09/04, with respect to the rejection(s) of claim(s) 14-17 and 27-29 under Bhagavatula have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Killian.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Reference previously cited to Kawachi (US 4,781,424) is of interest for teaching the inherent benefits of producing grooves between waveguide cores. Kawachi teaches that grooves between waveguide cores reduces mechanical stress in the waveguide and improves birefringence. Ogusu (US 5,799,118) is of interest for the teachings of Figure 17C. Ogusu shows a core buried in a lower cladding layer wherein a groove is made to a point lower than the core and then filled with another material. A material coefficient of thermal expansion is matched to the substrate to reduce thermal stresses (Column 7, lines 48-65). Ogusu does not further teach a passivation layer over a waveguide core and an overcladding, or a further groove-cutting of the filler material. Itoh (US 6,625,370) is of interest for teaching a zero total stress system (Column 8, lines 3-10) wherein polarization (as related to birefringence) insensitivity is achieved. An undercladding layer is etched to a point lower than a core portion and is then overclad (Figure

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2E). Though "other materials" (Column 9, lines 51-60) can be used, a passivation layer is absent as is further grooving of the overcladding layer.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krystyna Suchecki whose telephone number is (571) 272-2495.

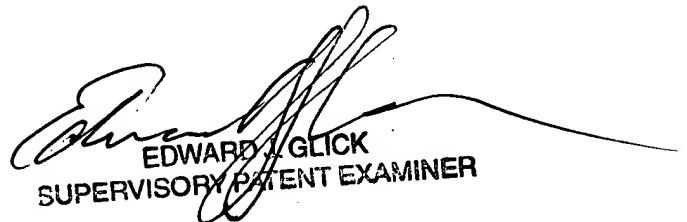
The examiner can normally be reached on M-F, 9-5.

21. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

22. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER